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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/576,023

04/17/2006

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EXAMINER

TEJANO, DWIGHT ALEX C

ART UNIT

PAPER NUMBER

2622

NOTIFICATION DATE

DELIVERY MODE

05/08/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com  
pto@gbpatent.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/576,023	TOSHIKIYO, KIMIAKI	
	<b>Examiner</b>	<b>Art Unit</b>	
	Dwight Alex C. Tejano	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☒ Claim(s) 1-15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 April 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>17 Jul 2006, 08 Dec 2006</u> .                                | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of Group II, claims 9-15, in the reply filed on 06 April 2009 is acknowledged. The traversal is on the ground(s) that there exists a single inventive concept, defining a uniting special technical feature between the two groups. This argument is found to be persuasive.

As such, the restriction requirement is withdrawn, and claims 1 – 15 present in the application have been examined.

### ***Drawings***

Figures 1 – 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

**Claims 1 – 15** are objected to because of the following informalities:

**Claims 1 and 9** recite the limitation "said light-transmitting film" in the phrase "wherein said light-transmitting film forms a zone in which a width..." There is insufficient antecedent basis for this limitation in the claim. In an anterior portion of the claim, the phrase "a plurality of light-transmitting films" is present, but this, at present, does not provide proper antecedence for "said light-transmitting film."

The Examiner assumes that this is supposed to read "a light-transmitting film of the plurality of light-transmitting films."

Additionally, the word "said" in the phrase "the plurality of said light-transmitting films form an effective refractive..." present in both claims 1 and 9 should be removed. Optionally, the limitation could be reworded to refer to the phrase "a light-transmitting film of the plurality..." that was previously assumed by the Examiner.

**Claim 11:** The "s" in "devices" at the conclusion of the sentence should be removed.

**Claims 2 – 8 and 10 – 15** are dependent upon claims 1 and 9 and, thus, inherits the objection.

Appropriate correction is required.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the

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unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**Claims 1, 5 – 9, 11, and 15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over**

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**claims 1, 7, 9 – 12, 14, and 18 of copending Application No. 10/576,273.** Although the conflicting claims are not identical, they are not patentably distinct from each other because the additional limitations present in the instant application are obvious results of efficient use of digital camera components.

This is a provisional obviousness-type double patenting rejection.

**Claim 1** of the present application presents a light-collecting device with the limitations of:

- a) a substrate into which the incident light is incident
- b) above said substrate, a plurality of light-transmitting films formed in a region into which the incident light is incident
- c) wherein said light-transmitting film forms a zone in which a width of each zone is equal to or shorter than a wavelength of the incident light
- d) each zone shares a center point which is located at a position displaced from the center of said device
- e) the plurality of said light-transmitting films form an effective refractive index distribution.

Claim 1 of copending Application No. 10/576,273 (hereafter, "273") reads directly on limitations a – c and e. However, the claims of 273 as the presently read do not mention limitation d. Despite this, the addition of limitation d would be obvious to one of ordinary skill in the art, as this would be easiest logical step for why one would include a diffractive element in an image pickup apparatus in the first place. More plainly, a

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diffractive optical element (in this case, the light-transmitting film) is designed to bend light of certain wavelengths at certain angles toward specific locations. Because of the sensitivities of the image pixel array, it would be best for light to be bent toward the center of the pixel for maximum light collection efficiency. Therefore, it would be obvious that, if light-transmitting films are present, that their individual zones would be configured to share a center point located at the position displaced from the center. The only other option would be to direct light *away* from the imaging device, which would effectively invalidate the device itself.

**Claims 5, 6, 7, and 8** of the instant application are read directly upon by claims 7, 9, 10, and 11, respectively of the '273 application.

**Claim 9** is an apparatus variant of claim 1 of the present application. In the same manner as limitations a – c and e of claim 1 were read upon by claim 1 of 273, so are limitations a – c and e of claim 9 read upon by claim 12 of 273. For the same rationale as previously presented, the inclusion of limitation d would be obvious to one of ordinary skill in the art.

**Claims 11 and 15** of the present application are read directly upon by claims 14 and 18, respectively, of 273.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1 – 5 and 9 – 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Meyers (EP 0809124 A2.)**

Regarding **claim 1**, Meyers discloses a diffractive/refractive lenslet array (light-collecting device) that is associated with a photosensor device. More specifically to the present application, Meyers discloses a substrate into which the incident light is incident (photosensitive imaging array, 30) and a plurality of light transmitting films (lenslets, 12) formed in a region in which the incident light is incident above said substrate (lenslet array, 10.)

The limitation wherein each light-transmitting film forms a zone in which a width of each zone is equal to or shorter than a wavelength of the incident light is inherently present in Meyers. The lenslet array is made of achromatized refractive/defractive lenslets [p. 3, ln. 46], meaning that lenslet array has been fabricated in such a way such that there are zones (in this case, the area within the concentric circles) that become progressively smaller as the circles expand from the local center (Fig. 1.) This spacing defines a zone width that directs the incident light in a certain manner – in this case, toward the photosensitive site [p. 4, ln. 43 – 55.] Although this is not explicitly stated,



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these zone widths must be equal to or shorter than a wavelength of the incident light because that is how diffraction grating lenses are formed (for example, see Shiono, et al., US 5,742,433, Figs. 4, 5 or Kobayashi, US 2002/0001066, Figs. 5A/B.) Because this property is inherent in refractive lenslets, this limitation is considered disclosed by Meyers

Finally, Meyers discloses that each zone shares a center point which is located a position displaced from the center of said device (R/G/B pixels, Fig. 2) and that the plurality of light transmitting films form an effective refractive index distribution (p. 5, ln. 5, equation dependent on incident wavelength.)

Regarding **claim 2**, Meyers meets the limitations of claim 1, as discussed above. Furthermore, Meyers discloses that the light is collected in a center plane made of said light transmitting films and that the light is incident at an angle asymmetrical to the center of the plane made of said light-transmitting films (Fig. 2)

Regarding **claims 3 and 4**, Meyers discloses the limitations of claim 1, as discussed previously. However, Meyers does not specifically disclose an amount of phase change of incident light approximately according to the equation:

$$\phi(x) = Ax^2 + Bx\sin(\theta) + 2m\pi .$$

Meyers also does not specifically disclose a difference of refractive indices according to the equation:

$$\Delta n(x) = \Delta n_{\max} \left[ \frac{\phi(x)}{2\pi} + C \right].$$

Despite these, it is assumed that, when a semiconductor compound recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. Because the lenslets are diffractive/refractive in nature, adapted to direct incident light upon a specific point in the substrate, they meet this requirement. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of anticipation has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977.)

As such, these equations are considered inherently present in Meyers.

Regarding **claim 5**, Meyers discloses that the heights of the light transmitting films (lenslets, 12) are constant in a direction normal to said light transmitting film (Fig. 2.)

**Claim 9** is an inherent apparatus variation of the device of claim 1. The claim is, therefore, interpreted and rejected accordingly.

As to **claim 10**, Meyers meets the limitations of claim 9 and further discloses that there are off-centered light-transmitting films (the full lenslet array with multiple off-centered lenslet segments, Fig. 1) is also formed in an area shared by one light-

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collecting device and another light-collecting device in an adjacent unit pixel (multiple pixels, 20, within a single lenslet segment, Fig. 2.)

As to **claim 11**, Meyers meets all of the limitations of claim 9, as earlier discussed. Additionally, Meyers discloses a first unit pixel device and a first light-collecting device (20, "R") for a first color light out of incident light (red.) Meyers continues disclosing a second unit pixel and a second light-collecting device (20, "G") for a second color light which has a typical wavelength that is different from a typical wavelength of the first color light (red and green have different wavelengths). Finally, the focal length of the second color is equal to a focal length of the first color light in said first light-collecting devices (Figs. 3A, 4A, 5A.)

As to **claim 12**, Meyers meets the limitations of claim 9 and further discloses that the focal point is set at a predetermined position by controlling a refractive index distribution of said light-transmitting film (p. 5, ln. 10.)

As to **claim 13**, Meyers meets the limitations of claim 9 and further teaches that each of the unit pixels further includes a light-collecting lens (lenslets, 12) on a light-outgoing side of the said light-collecting device.

As to **claim 14**, Meyers meets the limitations of claim 9 and furthermore illustrates in Fig. 1 that the refractive index distribution of said light-transmitting film is

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different between light-collecting devices of said unit pixels located in the center of a plan on which said unit pixels are formed and light-collecting devices of said unit pixels located in the periphery of the plane. Meyers also discloses this in the tables reflecting the adjusting values dependent on the degree field (Example A, B, C.)

As to **claim 15**, Meyers meets the limitations of claim 9, as previously discussed. Moreover, Meyers discloses that in the unit pixels are located in a center of a plane on which said unit pixels are formed (photosensitive imaging array, 30), a central axis (mechanical optical axis, 14) of each of said light-receiving devices is placed to match a central axis of each of said light-collecting device (Fig. 2.) Finally, Meyers discloses that in the unit pixels located in the periphery of the center of the plane, a central axis of each of said light-collecting devices are placed toward the center (oblique angled incident light, Fig. 2.)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 6 – 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyers in view of Dellwo, et al. (US 7,390,532 B2.)**

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Regarding **claims 6, 7 and 8**, Meyers meets all of the limitations present in claim 1, as discussed in a previous section. However, Meyers fails to disclose the light-transmitting films including one of the compounds claimed in claims 6, 7, or 8. Despite this, the Examiner maintains that it was well known in the art to include these compounds in the creation of the lenslets, as disclosed by Dellwo, et al. (hereafter, "Dellwo.")

Dellwo discusses a method for the production of optical elements with gradient structures. In his method, he discloses that the optical elements (light-transmitting films) includes one of  $\text{TiO}_2$ ,  $\text{ZrO}_3$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{Si}_3\text{N}_4$ , and  $\text{Si}_2\text{N}_3$  (c.9, ln. 1 – 14.) He also discloses that the optical elements includes one of  $\text{SiO}_2$  doped with B or P (Boro-Phospho Silicated Glass) and Teraethoxy Silane (c. 7, ln. 51 – 64.) Finally, Dellwo discloses the optical element including one of benzocyclobutene, polymethacrylate, polyamide, and polyimide (c. 6, ln. 13 – 31.)

Because the lenslets of the lenslet array are themselves "optical elements with a gradient structure" – that is, a diffractive gradient optical element – it would be obvious to one of ordinary skill in the art that such a process as defined by Dellwo, as doing so would allow one to manufacture the lenslets and, further, lenslet array used in the invention disclosed by Meyers.

***Citation of Pertinent Art***

The prior art made of record is considered pertinent to the applicant's disclosure, but is not relied upon as a reference for the preceding sections:

- Bryan, et al. (US 4403827 A) discloses a process for forming a diffraction grating on an imaging surface.
- Kwon (US 5561683 A) discloses a gradient light-emitting device.
- Jain (US 5477383 A) discloses an optical array with a series of off-center diffractive elements above a substrate.
- Okuno (US 20030189755 A1) discloses a diffractive optical element.
- Chang (US 7038184 B2) discloses an image sensor with a diffraction array.
- Lee, et al. (US 20020135825 A1) discloses a sensor with a diffraction layer.
- Ehbets, et al. (US 6545808 B1) discloses a phase masking technique that creates a variable diffraction grating on an imaging surface.
- Goto (US 20030227684 A1) discloses diffractive optical elements, off-centered from the imaging plane.
- Unno (US 6327086 B1) discloses an optical diffraction device.
- Konno, et al. (US 5555129 A) discloses an optical low pass filter.
- Ushiro, et al. (US 20070091453 A1) discloses a micro-lens production method with diffraction grating structures.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dwight Alex C. Tejano whose telephone number is (571) 270-7200. The examiner can normally be reached on Monday through Friday 10:00-6:00 with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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